38BYW
Split-System Heat Pump

Visit www.carrier.com

Installation and Start-Up Instructions

NOTE: Read the entire instruction manual before starting the installation.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol ⚠ . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

⚠ WARNING

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

INSTALLATION RECOMMENDATIONS

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. Locate unit away from windows.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.
3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal opening with RTV or other pliable silicon-based caulk. (See Fig. 2.)
6. Avoid direct tubing contact with water pipes, ductwork, floor joists, wall studs, floors, and walls.

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Fig. 1—Split-System Heat Pump

7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing. (See Fig. 2.)
8. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to shape of tubing insulation. (See Fig. 2.)
10. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.

When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of the same size when connected by 15 ft of field-supplied or factory accessory tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover.

INSTALLATION

Step 1—Check Equipment and Jobsite

INSPECT EQUIPMENT — File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit service panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2—Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tiedown bolts should be used and fastened through knockouts provided in unit base pan. Refer to Fig. 3 for pad dimensions and dimensions needed to mount unit to pad.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

NOTE: Avoid contact between tubing and structure

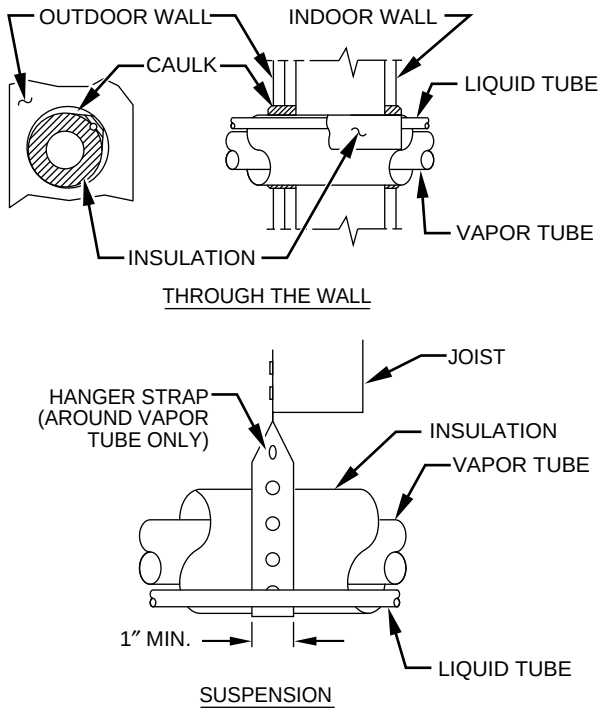

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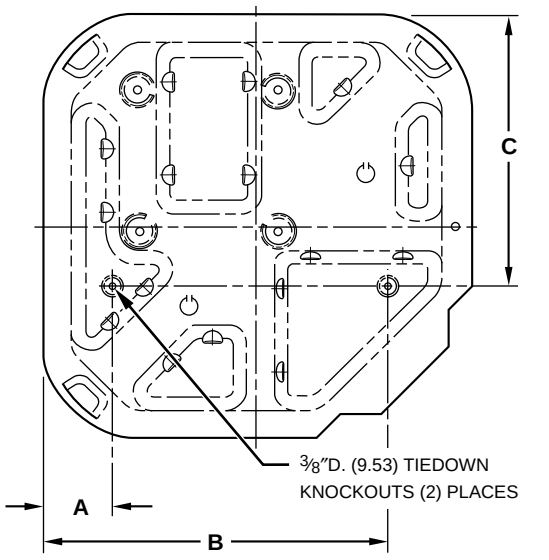
Fig. 2—Connecting Tubing Installation



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UNIT SIZE	MIN. PAD DIM. (IN.)	TIEDOWN KNOCKOUT LOCATIONS		
		A (In.)	B (In.)	C (In.)
38BYW024-060	30 X 30	6-1/2	23-1/2	20

Fig. 3—Mount Unit to Pad

Step 3—Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Common clearances are 6 in. on 1 side, 12 in. on 2 sides, and 30 in. on service side of unit. Allow 24 in. between units. Discharge air must be unobstructed and must not recirculate.

Position so snow, ice, or water from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. above roof surface. Place unit above a load-bearing wall and isolate unit and tubing set from structure.

Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

Step 4—Operating Ambients

The minimum outdoor operating ambient in cooling mode is 55°F, and the maximum outdoor operating ambient in cooling mode is 125°F. The maximum outdoor operating ambient in heating mode is 66°F.

Step 5—Elevate Unit

⚠ CAUTION

Accumulation of water and ice in base pan may cause equipment damage.

In areas where prolonged freezing temperatures are encountered, elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit.

Step 6—Check Defrost Thermostat

Check defrost thermostat to ensure it is properly located and securely attached. There is a liquid header with a brass distributor and feeder tube going into outdoor coil. At the end of 1 of the feeder tubes, there is a 3/8-in. OD stub tube approximately 3 in. long. (See Fig. 4.) The defrost thermostat should be located on stub tube. Note that there is only 1 stub tube used with liquid header, and on most units it is the bottom circuit.Metering Device

Step 7—Metering Device

NOTE: A thermostatic expansion valve (TXV) is required on all 38BYW units. Step 8 refers to installation of the TXV.

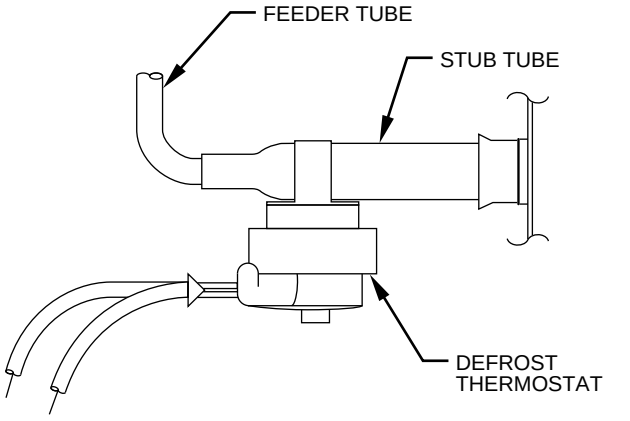

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Fig. 4—Defrost Thermostat Location

⚠ CAUTION

Remove indoor coil piston if unit is to be installed on system with a TXV metering device.

Step 8—Remove Indoor AccuRater® Piston and Install TXV

⚠ CAUTION

For proper unit operation and reliability, units must be installed with a field-supplied hard shut-off TXV. Do not install with evaporator coils having capillary tube metering devices or piston.

After removing existing AccuRater from indoor coil, install field-supplied bi-flow hard shut-off TXV kit. (See Fig. 5 and 6.)

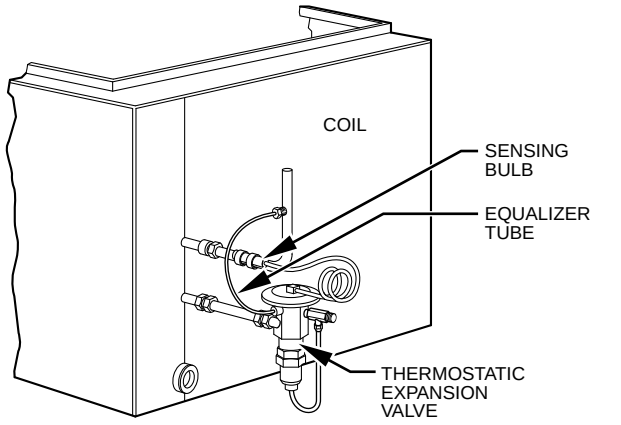

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Fig. 5—Typical TXV Installation

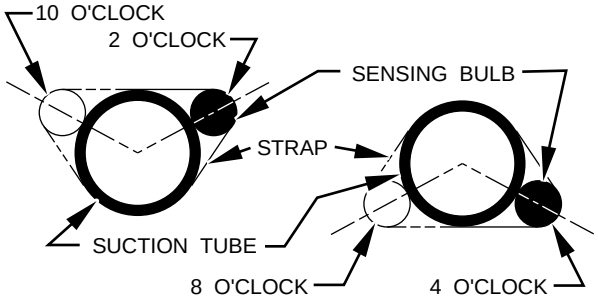

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Fig. 6—Positioning of Sensing Bulb

For TXV kit part number and charging instruction, refer to TXV label on your unit. If indoor unit (fan coil) comes factory equipped with a bi-flow hard shut off TXV, no TXV change is required.

Install TXV kit to indoor coil as follows:

1. Install suction tube adapter.
2. Install liquid flare-to-sweat adapter.
3. Connect external equalizer tube to fitting on suction tube adapter.
4. Position sensing bulb on horizontal portion of suction tube adapter. Secure using supplied hardware.
5. Insulate bulb after installation. (See Fig. 5.)
6. Leak check all connections.

Step 9—Make Tubing Connections

⚠ WARNING

Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

⚠ CAUTION

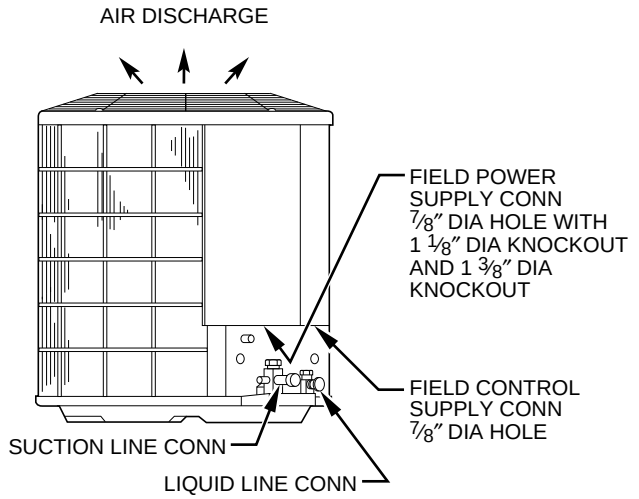
To prevent compressor damage DO NOT bury more than 36 in. of refrigerant tubing. If ANY tubing is buried, provide 6 in. vertical rise at service valve.

⚠ CAUTION

To prevent damage to unit or service valves observe the following:

- Use a brazing shield.
- Wrap service valves with wet cloth or use a heat sink material.

Connect outdoor unit to indoor sections using accessory tubing package or field-supplied tubing of refrigerant grade, correct size, and condition. For tubing requirements beyond 50 ft, consult your local distributor or the Long-Line Application Guideline. Refer to Fig. 7 for refrigerant tube dimensions and connections.


AIR DISCHARGE
FIELD POWER SUPPLY CONN 7/8" DIA HOLE WITH 1 1/8" DIA KNOCKOUT AND 1 3/8" DIA KNOCKOUT
FIELD CONTROL SUPPLY CONN 7/8" DIA HOLE
SUCTION LINE CONN
LIQUID LINE CONN

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UNIT SIZE	LIQUID TUBE		VAPOR TUBE	
	Conn Dia	Tube Dia	Conn Dia	Tube Dia
024	3/8	3/8	5/8	5/8
030, 036	3/8	3/8	3/4	3/4
042, 048	3/8	3/8	7/8	7/8
060	3/8	3/8	7/8	1-1/8

NOTE: Tube diameters are for lengths up to 50 ft. For tubing lengths greater than 50 ft, consult your local distributor.

Fig. 7—Refrigerant Tube Dimensions/Connections

If refrigerant tubing or indoor coil is exposed to atmosphere, it must be evacuated to a minimum of 500 microns to eliminate contamination and moisture in the system.

SWEAT CONNECTION

1. Consult local code requirements.
2. Remove plastic retainer holding outdoor piston in the liquid service valve and connect sweat/flare adapter provided to valve. (See Fig. 8.)

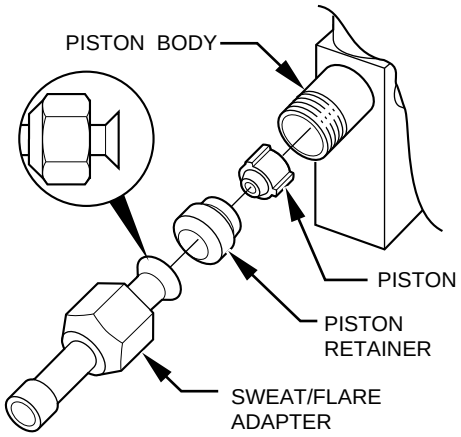

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Fig. 8—Liquid Service Valve

3. Connect refrigerant tubing to fittings on outdoor unit vapor and liquid service valves.
4. Service valves are closed from factory and ready for brazing.
5. After wrapping service valve with a wet cloth, tubing set can be brazed to service valve using either silver bearing or non-silver bearing brazing material.
6. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

Step 10—Make Electrical Connections

⚠ WARNING

To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage or phase imbalance (3 phase) may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect per NEC of adequate size to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

ROUTE GROUND AND POWER WIRES — Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box.

⚠ WARNING

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning can result in an electric shock, fire, or death.

CONNECT GROUND AND POWER WIRES — Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 9.

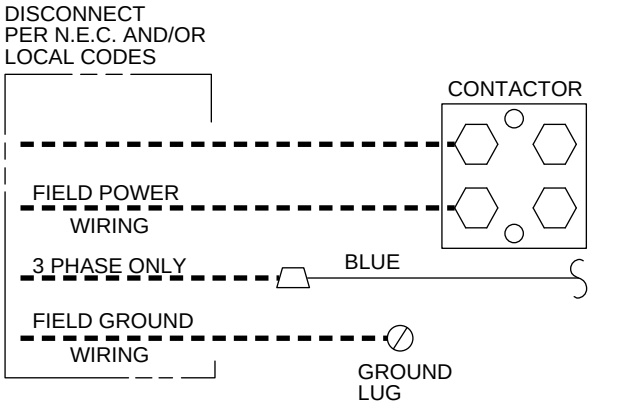

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Fig. 9—Line Power Connections

CONNECT CONTROL WIRING — Route 24-v control wires through control wiring grommet and connect leads to control wiring. (See Fig. 9.)

Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft from unit (as measured along the control voltage wires), use No. 16 AWG color-coded wire to avoid excessive voltage drop.

Use furnace transformer, fan coil transformer, or accessory transformer for control power, 24-v/40-va minimum.

NOTE: Use of available 24-v accessories may exceed the minimum 40-va power requirement. Determine total transformer loading and increase the transformer capacity or split the load with an accessory transformer as required.

NOTE: The defrost timer is factory set for 90-minute cycles. The timer can be field set for 30- and 50-minute cycles depending on defrost conditions in your geographical location.

Step 11—Compressor Crankcase Heater

When equipped with a crankcase heater, energize heater a minimum of 24 hr before starting unit. To energize heater only, set thermostat to OFF and close electrical disconnect to outdoor unit.

A crankcase heater is required if refrigerant tubing is longer than 50 ft.

NOTE: The Seasonal Energy Efficiency Ratio (SEER) and Heating Seasonal Performance Factor (HSPF) is obtained with the crankcase heater de-energized. To de-energize the crankcase heater, disconnect black crankcase heater wires at contactor. After disconnecting, make sure wires are isolated from all other electrical connections and components to prevent electrical shorting.

Step 12—Install Electrical Accessories

Refer to the individual instructions packaged with kits or accessories when installing.

Step 13—Start-Up and Check Charge

⚠ CAUTION

To prevent compressor damage or personal injury, observe the following:
• Do not overcharge system with refrigerant.
• Do not operate unit in a vacuum or at negative pressure.
• Do not disable low-pressure switch
In scroll compressor applications:
• Dome temperatures may be hot.
• In 3 phase application, incorrect phasing will cause reverse rotation, resulting in elevated noise levels, equalized pressures, and reduced current draw. Correct by reversing power connection L1 and L2 on contactor.

⚠ CAUTION

To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:
• Back seating service valves are not equipped with Schrader valves. Fully back seat (counter clockwise) valve stem before removing gage port cap.
• Front seating service valves are equipped with Schrader valves.

⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

Follow these steps to properly charge a system.

1. Fully back seat (open) liquid and vapor tube service valves.
2. Unit is shipped with valve stem(s) front seated (closed) and caps installed. Replace stem caps after system is opened to refrigerant flow. Replace caps finger-tight and tighten with wrench an additional 1/6 turn for front seating valves (female hex stem) or 1/12 turn for back seating valves (male square stem).
3. Close electrical disconnects to energize system.
4. Set room thermostat at desired temperature.
5. Set room thermostat to HEAT or COOL and fan to ON or AUTO mode, as desired. Operate unit for 15 minutes. Check system refrigerant charge.
6. Factory charge is shown on outdoor unit rating plate. Adjust charge in cooling mode by following procedure shown on the charging table. Check charge in heating mode by following procedure shown on heating check chart. Both are located on outdoor unit.

SEQUENCE OF OPERATION

NOTE: Defrost control board may be equipped with 5-minute lockout timer which may be initiated upon any interruption of power.

With power supplied to indoor and outdoor units, transformer is energized.

Cooling

On a call for cooling, thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes reversing valve, switching it to cooling position. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor circuit. R-G energizes indoor unit blower relay, starting the indoor blower motor on high speed.

When the thermostat is satisfied, its contacts open, de-energizing the contactor and blower relay. Compressor and motors should stop.

NOTE: If indoor unit is equipped with a time-delay relay circuit, the blower will run an additional 90 sec to increase system efficiency.

Heating

On a call for heating, thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor. Circuit R-G energizes indoor blower relay, starting blower motor on high speed.

Should temperature continue to fall, R-W2 is made through second-stage room thermostat bulb. Circuit R-W2 energizes a sequencer, bringing on first bank of supplemental electric heat and providing electrical potential to second heater sequencer (if used). If outdoor temperature falls below setting of outdoor thermostat (field-installed option), contacts close to complete circuit and bring on second bank of supplemental electric heat.

When thermostat is satisfied, its contacts open, de-energizing the contactor and sequencer. All heaters and motors should stop.

Defrost

The defrost control is a time/temperature control which includes a field-selectable (quick-connects located at board edge) time period between defrost cycles (30, 50, and 90 minutes), factory set at 90 minutes.

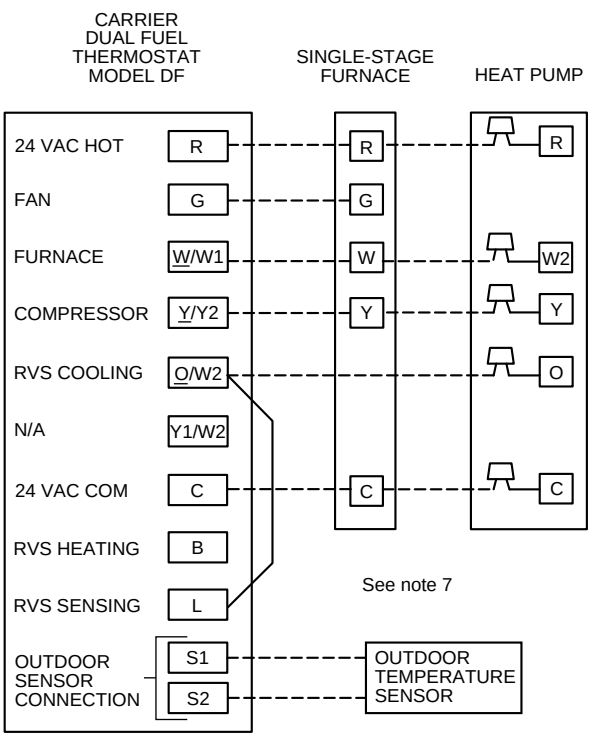
The electronic timer and defrost cycle start only when contactor is energized and defrost thermostat is closed.

The defrost mode is identical to cooling mode except that outdoor fan motor stops and second-stage heat is turned on to continue warming conditioned space.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that periodic maintenance **must** be performed on this equipment.

Leave User's Manual with homeowner. Explain system operation and periodic maintenance requirements outlined in manual. Frequency of maintenance may vary depending upon geographic areas, such as coastal applications which require more frequent maintenance.



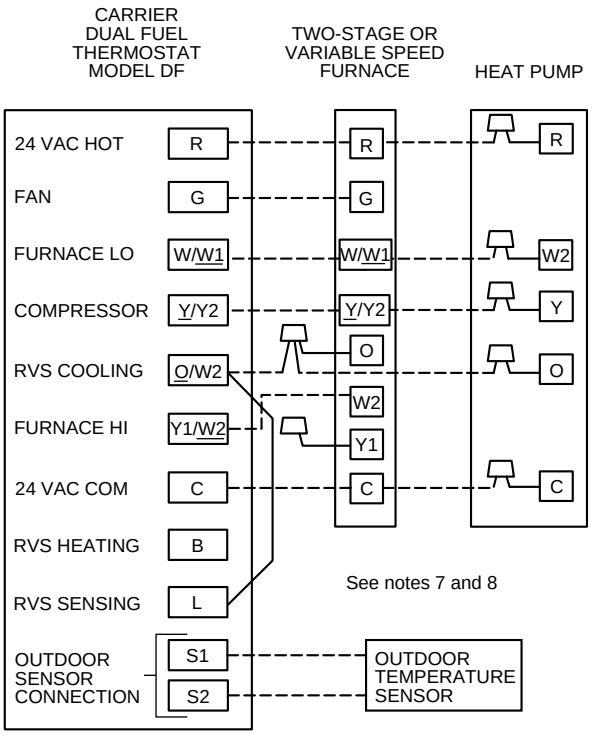
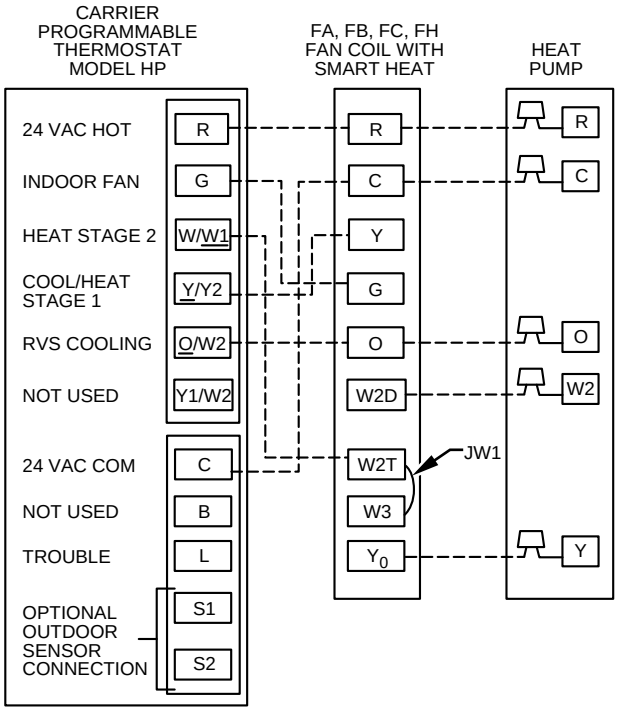


Fig. 10—Typical 24-v Circuit Conncetion using Carrier Model DF Thermostat with Single- or 2-Stage Furnace

→ **Table 2—Accessory Usage**

ACCESSORY	REQUIRED FOR LOW-AMBIENT APPLICATIONS (BELOW 55°F)	REQUIRED FOR LONG-LINE APPLICATIONS* (OVER 50 FT)	REQUIRED FOR BURIED LINE APPLICATIONS† (OVER 3 FT)
Crankcase Heater	Yes	Yes	Yes
Evaporator Freeze Thermostat	Yes	No	No
Accumulator	No	No	Yes
Compressor Start Assist Capacitor and Relay	Yes	Yes	Yes
Low-Ambient Controller, MotorMaster® Control, or Low-Ambient Pressure Switch	Yes	No	No
Wind Baffle	See Low-Ambient Instructions	No	No
Unit Risers	Recommended	No	No
Liquid-Line Solenoid Valve or Hard Shutoff TXV	No	See Long-Line Application Guideline	Yes
Ball Bearing Fan Motor	Yes‡	No	No

* For tubing line sets between 50 and 175 ft, refer to Residential Split System Long-Line Application Guideline.
† For buried line applications, refer to Residential Split System Buried-Line Application Guideline.
‡ Required for Low-Ambient Controller (full modulation feature) and MotorMaster Control only.



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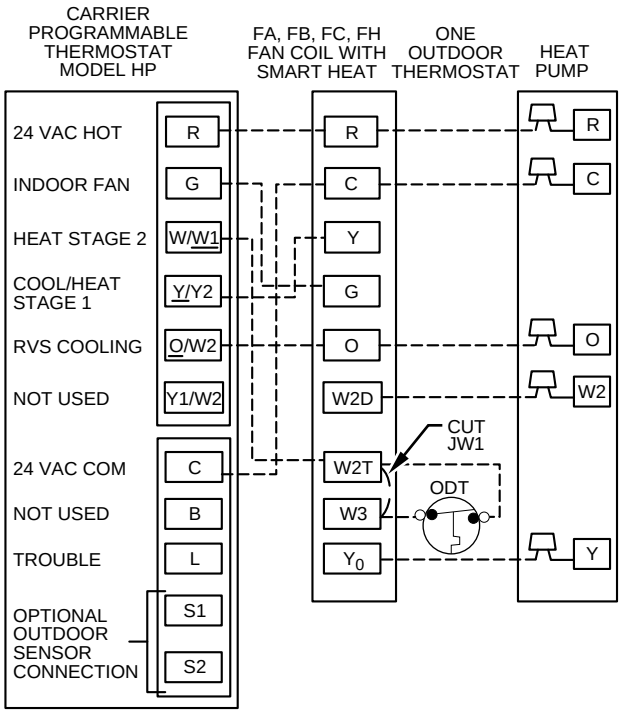

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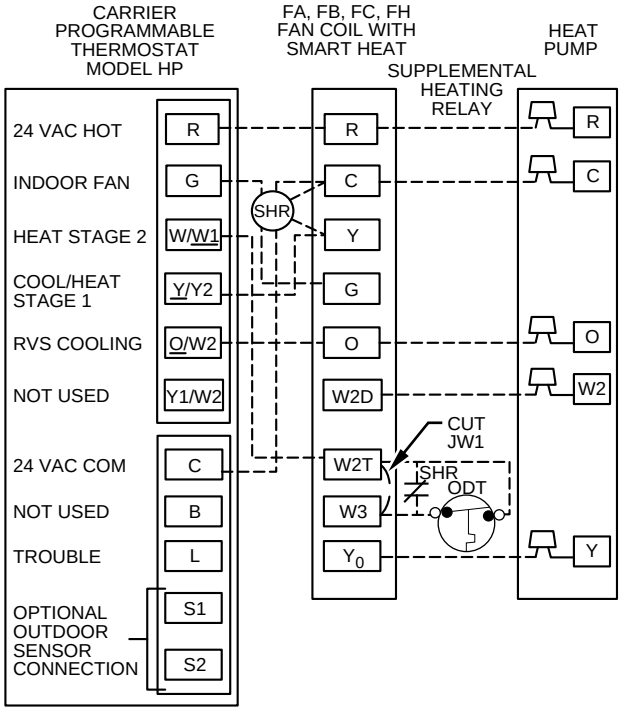

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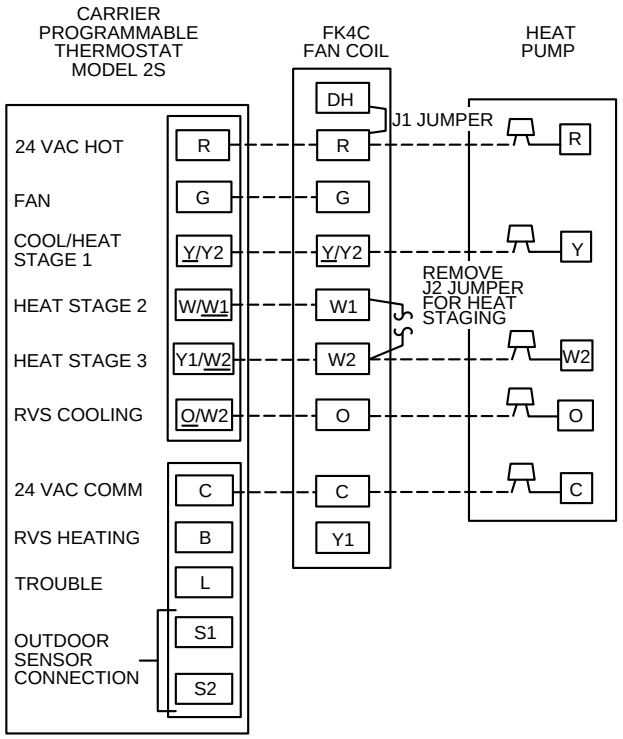

Smart Sequencing Application: Model 2S thermostat with switch C OFF and switch D ON uses single-speed heat pump, FK4 fan coil with selected 2:1 size ratio heaters. Provides 3 stages of auxiliary heat for even heating comfort via W/W1 and Y1/W2. Refer to FK4 Installation Instructions.

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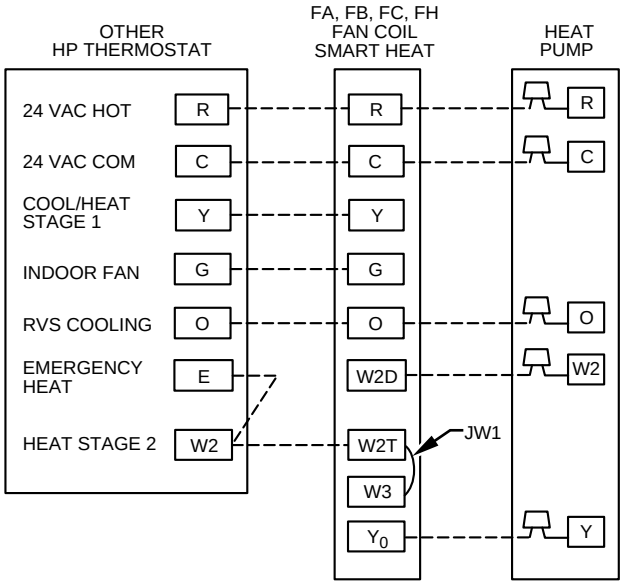
Fig. 11—Typical 24-v Circuit Connections using Carrier Model HP Thermostat with Smart Heat and No Outdoor Thermostat, 1 Outdoor Thermostat, or Supplemental Heat Relay and Carrier Model 2S Thermostat with FK4C Fan Coil and Smart Staging



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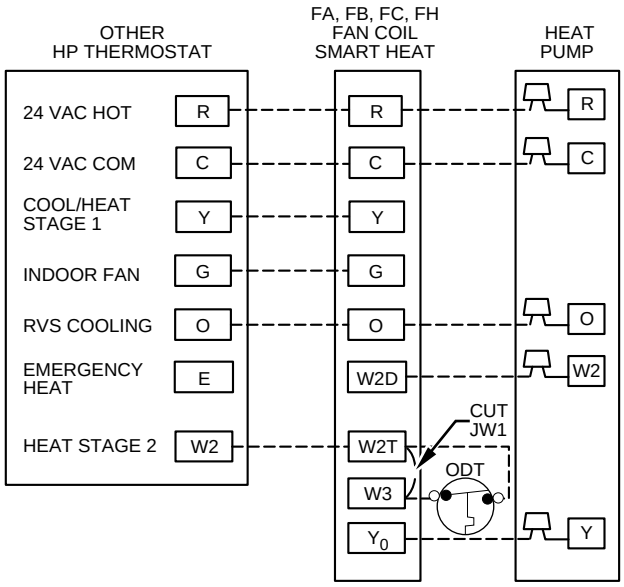

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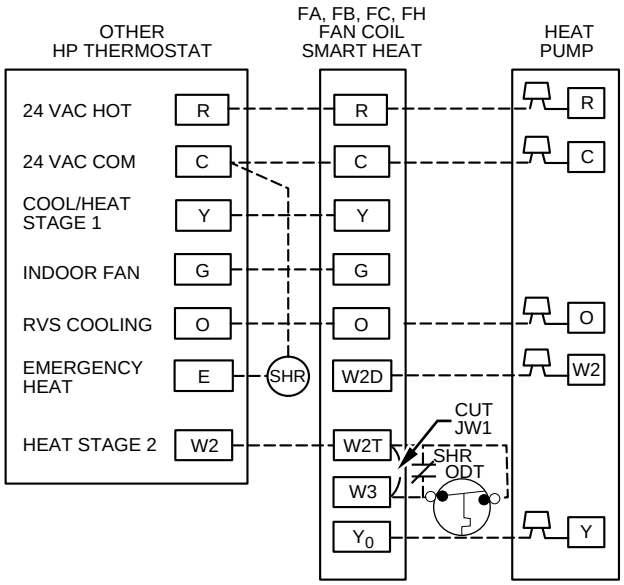

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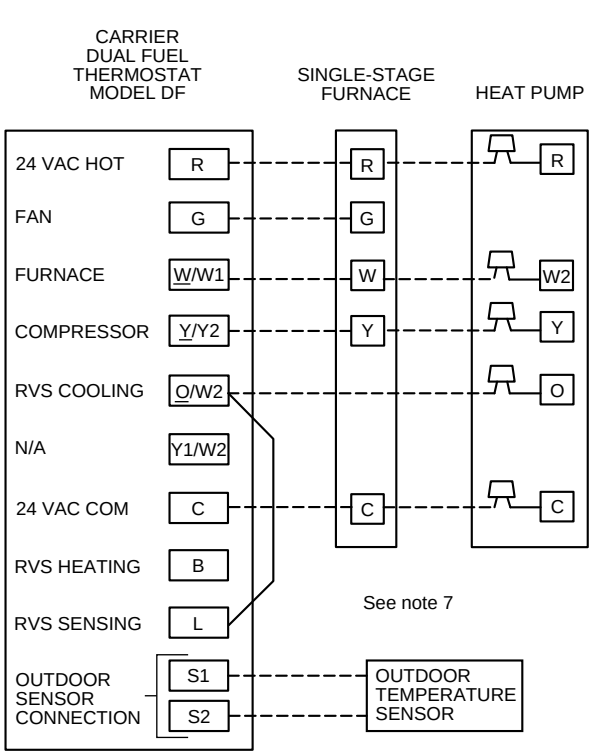
Fig. 12—Typical 24-v Circuit Connections using Other HP Thermostats with Smart Heat and No Outdoor Thermostat, 1 Outdoor Thermostat, or Supplemental Heat Relay



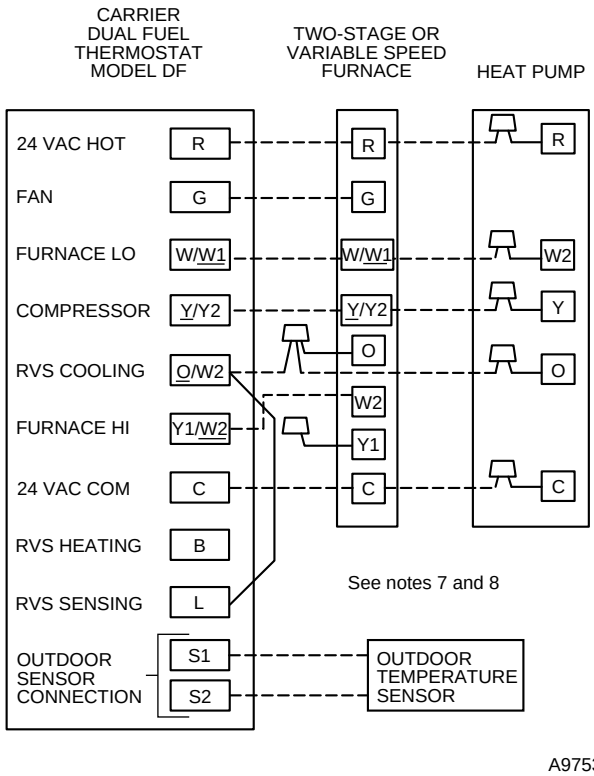


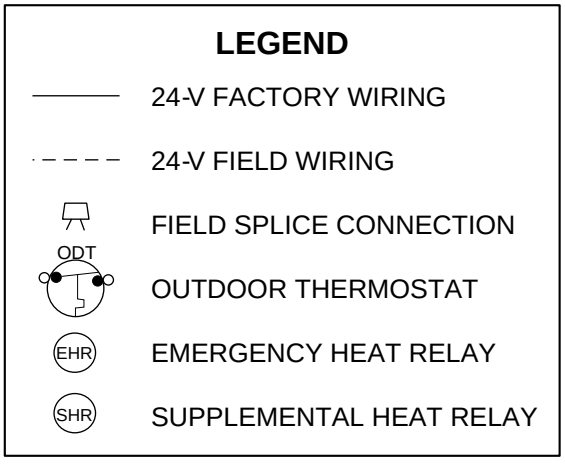
Fig. 13—Typical 24-v Circuit Connections using Carrier Model DF Thermostat with Single- or 2-Stage Furnace

WIRING DIAGRAM NOTES:

1. CARRIER THERMOSTAT WIRING DIAGRAMS ARE ONLY ACCURATE FOR MODEL NUMBERS TSTAT _ _ _ _ _ _ _.
2. WIRING MUST CONFORM TO NEC OR LOCAL CODES.
3. SOME UNITS ARE EQUIPPED WITH PRESSURE SWITCH(ES), TEMPERATURE SWITCH, OR 5-MINUTE COMPRESSOR CYCLE PROTECTION. CONNECT 24-V FIELD WIRING TO FACTORY-PROVIDED STRIPPED LEADS.
4. THERMOSTATS ARE FACTORY CONFIGURED WITH 5-MINUTE COMPRESSOR CYCLE PROTECTION AND 4 CYCLES PER HR LIMIT. SEE THERMOSTAT INSTALLATION INSTRUCTIONS FOR DETAILS.
5. TO STAGE ELECTRIC RESISTANCE HEAT, CONSULT OUTDOOR THERMOSTAT INSTALLATION INSTRUCTIONS.
6. UNDERLINED LETTER ON DUAL TERMINAL INDICATES ITS USAGE.

   FOR EXAMPLE: O/W2 MEANS O: O/W2 MEANS W2
7. OUTDOOR TEMPERATURE SENSOR MUST BE ATTACHED IN ALL DUAL FUEL INSTALLATIONS.

   JUMPER WIRE BETWEEN O/W2 AND L THERMOSTAT TERMINALS **MUST** BE PRESENT.
8. Y1 AND O CONNECTIONS TO 2-STAGE FURNACES **MAY NOT EXIST** OR MAY ONLY BE A WIRE RATHER THAN A SCREW TERMINAL.



SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs is available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

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